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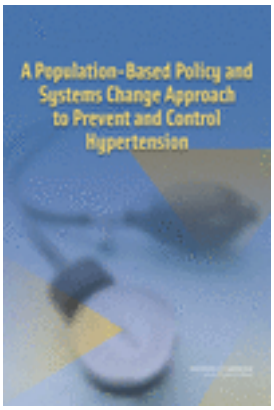

A Population-Based Policy and Systems Change Approach to Prevent and Control Hypertension

Committee on Public Health Priorities to Reduce and Control Hypertension in the U.S. Population; Institute of Medicine

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Hypertension is one of the leading causes of death in the United States, affecting nearly one in three Americans. It is prevalent in adults and endemic in the older adult population. Hypertension is a major contributor to cardiovascular morbidity and disability. Although there is a simple test to diagnose hypertension and relatively inexpensive drugs to treat it, the disease is often undiagnosed and uncontrolled. A Population-Based Policy and Systems Change Approach to the Prevention and Control Hypertension identifies a small set of high-priority areas in which public health officials can focus their efforts to accelerate progress in hypertension reduction and control. It offers several recommendations that embody a population-based approach grounded in the principles of measurement, system change, and accountability. The recommendations are designed to shift current hypertension reduction strategies from an individual-based approach to a population-based approach. They are also designed to improve the quality of care provided to individuals with hypertension and to strengthen the Center for Disease Control and Prevention's leadership in seeking a reduction in the sodium intake in the American diet to meet dietary guidelines.The book is an important resource for federal public health officials and organizations, especially the Center for Disease Control and Prevention, as well as medical professionals and community health workers.

SUMMARY

In today's public health world, the term "neglected disease" conjures up obscure tropical illnesses of little relevance to contemporary practice in the United States. Yet, when one considers the actual meaning of the words, the time may be right to add hypertension to this list. Despite the magnitude of hypertension-associated morbidity and mortality and the $73 billion in annual costs to the health care system, hypertension prevention and control is only one of a number of programs competing for a total of only $54 million (2009) in CDC's entire Heart Disease and Stroke Prevention portfolio.

The lack of attention to hypertension goes against the objective facts. Hypertension is one of the leading causes of death in the United States. In 2005, high blood pressure was responsible for about one in six deaths of U.S. adults and was the single largest risk factor for cardiovascular mortality accounting for about 45 percent of all cardiovascular deaths. Based on data from the Centers for Disease Control and Prevention (CDC) and the National Heart, Lung, and Blood Institute (NHLBI) from 1995 to 2005, the death rate from high blood pressure increased by 25 percent and the actual number of deaths rose by 56 percent (AHA, 2009a).

Hypertension, defined for adults as a systolic pressure of 140 mm Hg or greater or a diastolic pressure of 90 mm Hg or higher, is highly prevalent (Chobanian et al., 2003). Approximately 73 million Americans or nearly one in three U.S. adults has hypertension (AHA, 2009b; Fields et al., 2004). An additional 59 million have prehypertension, which is defined as blood pressure ranging from 120-139 mm Hg systolic and/or 80-89 mm Hg diastolic (Chobanian et al., 2003).

The risk of developing hypertension increases with age and in older age groups it is more common than not. Based on data from the Framingham study, the lifetime risk of hypertension is estimated to be 90 percent for people with normal blood pressure at age 55 or 65 who live to be age 80 to 85, respectively (Cutler et al., 2007; Vasan et al., 2002).

Hypertension is costly to the healthcare system. It is the most common primary diagnosis in America (Chobanian et al., 2003), and it contributes to the costs of cardiovascular disease (coronary heart disease, myocardial infarction) and stroke. The American Heart Association (AHA) recently reported the direct and indirect costs of high blood pressure as a primary diagnosis as $73.4 billion for 2009 (Lloyd-Jones et al., 2009). With respect to the cost of treating hypertension, an analysis by DeVol and Bedroussian (2007) estimated that the total expenditure for the population reporting hypertension as a condition in the Medical Expenditure Panel Survey (MEPS) was $32.5 billion in 2003 (DeVol and Bedroussian, 2007). Another study

estimated the total incremental annual direct expenditures for treating hypertension (the excess expenditure of treating patients with hypertension compared to patients without hypertension) to be about $54 billion in 2001 (Balu and Thomas, 2006).

Much is known about the health consequences and costs associated with hypertension (Chapters 1 and 2). Robust clinical and public health research efforts have developed safe and cost-effective nonpharmacological and pharmacological interventions (Chapters 4 and 5) to prevent, treat, and control hypertension. Nonetheless, millions of Americans continue to develop, live with, and die from hypertension because we are failing to translate our public health and clinical knowledge into effective prevention, treatment and control programs. In the committee's view this current state is one of neglect; as defined by *Webster's*, "giving insufficient attention to something that merits attention." The recommendations offered in this report outline a population-based policy and systems change approach to addressing hypertension that can be applied at the federal, state, and local level. It is time to give full attention and take concerted actions to prevent and control hypertension.

THE CHARGE TO THE COMMITTEE

The CDC Division for Heart Disease and Stroke Prevention (DHDSP) provides national leadership to reduce the burden of disease, disability, and death from heart disease and stroke. DHDSP is co-lead, along with the NHLBI, for the Healthy People 2010 objectives related to heart disease and stroke including four objectives specific to hypertension (Table S-1).

TABLE S-1 Healthy People 2010 Focus Area 12: Heart and Stoke, Blood Pressure Objectives

Focus Area	Blood Pressure Objective
12-9.	Reduce the proportion of adults with high blood pressure.
12-10.	Increase the proportion of adults with high blood pressure whose blood pressure is under control.
12-11.	Increase the proportion of adults with high blood pressure who are taking action (for example, losing weight, increasing physical activity, or reducing sodium intake) to help control their blood pressure.
12-12.	Increase the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high.

SOURCE: CDC, 2002.

Findings from the Healthy People 2010 Midcourse Review (CDC, 2002) indicated that the nation was moving away from making progress in the target objectives as reflected by increases in the prevalence of high blood pressure among adults and among children and adolescents. This moving away from Healthy People 2010 goals provided an increased emphasis for a DHDSP programmatic focus on hypertension.

The DHDSP has developed a strategic plan to reduce and control hypertension that recognizes the urgent need to implement known effective practices and to develop new ones. The plan identifies a number of action areas and goals for the prevention and control of hypertension. The CDC requested assistance and guidance from the Institute of Medicine (IOM) to determine a small set of high-priority areas in which public health can focus its efforts to accelerate progress in hypertension reduction and control. Specifically, the CDC requested that the IOM convene an expert committee to review available public health strategies for reducing and controlling

hypertension in the U.S. population, including both science-based and practice-based knowledge. In conducting its work, the committee was asked to consider the following questions:

1. Identify the particular role of CDC's DHDSP in addressing the highest-priority areas.
2. Identify the role of state health departments in advancing progress in the priority action areas.
3. Identify the role of other public health partners.
4. What visible impacts can be expected if DHDSP focuses its efforts in these priority areas?
5. What indicators should be monitored to assess the progress of DHDSP, state health departments, and partners in implementing the committee's recommendations?
6. What are the potential positive and negative impacts on health disparities that could result if the committee's recommendations are implemented?
7. What indicators should be monitored related to health disparities to ensure the intended impact of the DHDSP priority action areas identified?

The committee was not expected to conduct a new, detailed review of peer-reviewed literature on hypertension because such literature reviews, meta-analyses, and syntheses already exist and have been used to inform existing guidelines and recommendations.

FINDINGS AND RECOMMENDATIONS

The CDC, through the Division of Heart Disease and Stroke Prevention, has leveraged its broader cardiovascular disease prevention and control programmatic efforts to address hypertension primarily through its state heart disease and stoke prevention programs. Many of these efforts are described in Chapter 3 and throughout other chapters. Objectively however, there are several significant problems with the current status and direction of hypertension prevention and control activities:

- Hypertension is only one component of a larger cardiovascular disease prevention program that as a consequence, has more of a medical care rather than a population-based prevention focus based on system change.
- The CDC's cardiovascular disease program in general, and the hypertension program in particular, are dramatically under funded relative to the preventable burden of disease and the strategy and action plan that has been developed.

In light of the current situation, short-term programmatic priorities must be tempered by the economic reality that the absolute amount of prevention resources available to CDC are limited and thus cost effectiveness and absolute costs must be considered. Compared with interventions directed towards individuals, population-based interventions and interventions directed at system improvements and efficiencies are more likely to be more practical and realistic in the current resource-constrained environment. The committee believes that the reality of limited resources for hypertension prevention requires that DHDSP shift the weight of its focus to approaches that cater to the strength of the public health system – population-based and systems approaches rather than health care-based approaches.

To that end, the committee has recommended a number of high priority strategies to prevent and control hypertension to the CDC and DHDSP. The recommendations embody a population-based approach grounded in the principles of measurement, system change, and accountability and bridge public health and clinical care. In brief, the recommendations seek to:

- Shift the balance of the Division's hypertension priorities from individual-based strategies to population-based strategies to:
  - strengthen collaboration among CDC units (and their partners) to ensure that hypertension is included as a dimension of other population-based activities around healthy lifestyle improvement, particularly greater consumption of potassium rich fruits and vegetables, increased physical activity, and weight management
  - strengthen CDC's leadership in monitoring and reducing sodium intake in the American diet to meet current dietary guidelines
  - improve the surveillance and reporting of hypertension to better characterize general trends and trends among subgroups of the population
- Promote policy and system change approaches to:
  - Improve the quality of care provided to individuals by assuring that individuals who should be in treatment are in treatment and receive care that is consistent with current treatment guidelines
    - Increase the importance of treating systolic hypertension, especially among the elderly
  - Remove economic barriers to effective antihypertensive medications
  - Provide community-based support for individuals with hypertension through community health workers who are trained in dietary and physical activity counseling.

The population-based policy and systems approach recommended is not limited to the CDC and DHDSP but also extends and applies to state and local health departments and to other partners. The high priority recommendations directed to DHDSP are discussed in Chapters 4 and 5 have been translated for action by state and local health jurisdictions in Chapter 6. Successfully implementing a population-based approach policy and systems approach at all levels will depend on the resources available and systems of accountability to ensure that resources are appropriately aligned and outcomes are achieved; those recommendations are also found in Chapter 6. For ease of presentation in this summary, the recommendations for the DHDSP and their most important partners, state and local health jurisdictions, have been integrated in this summary but are discussed separately in relevant chapters.

Population-based strategies

Hypertension is highly preventable and manageable through lifestyle interventions. Given the co-occurrence or association with poor diet, physical inactivity, and obesity, which appear to be on the increase, lifestyle modifications are of even greater importance. Government public health agencies are the only organizations with the mandate to provide population-wide services, and the CDC and state and local public health agencies are more experienced and skilled in population-based interventions than in interventions that provide health care directly to individuals. Through leadership and convening strategies, government public health agencies can galvanize political commitment, develop policy, prioritize funding, and coordinate programs (Baker and Porter, 2005).

A stronger focus on primary prevention of hypertension is consistent with DHDSP's responsibility as co-lead of Healthy People 2010's focus area on heart disease and stroke and in achieving progress in reducing the proportion of adults with high blood pressure. The committee acknowledges that within the CDC, the DHDSP is not the focal point for addressing dietary imbalances, physical inactivity, and other determinants to prevent the development of risk factors and progression of high blood pressure. It also acknowledges that the focus of DHDSP activities is primarily adults, not children. The committee is also aware that the DHDSP, through the Cardiovascular Health Collaboration of the National Center for Chronic Disease Prevention and Health Promotion, collaborates with units across CDC. The committee believes, however, that this collaboration can be strengthened and extended to leverage the efforts and resources of those programs to ensure proper attention to the prevention of hypertension and the reduction of hypertension risk factors.

Based on the review of the literature there is strong evidence linking overweight and obesity, high sodium intake, low potassium intake, unhealthy diet, and decreased physical activity to hypertension. These risk factors contribute substantially to the burden of hypertension in the United States, further; the prevalence of many of these risk factors is increasing. The observational and randomized clinical trial literature on interventions to reduce overweight and obesity, decrease sodium intake, support eating a healthy diet, increase potassium intake and increase physical activity also indicate that these risk factors are modifiable and that they can help reduce blood pressure levels. The committee concludes in light of : (1) the high prevalence of these risk factors that contribute significantly to the development of high blood pressure, (2) existing interventions to reduce these risk factors, and (3) the potential to reduce the burden of hypertension if the interventions are implemented, that actions to reduce these risk factors merit a high priority. The committee recommendations follow; the number appearing before the recommendation refers to the chapter and number of the recommendation in that chapter.

4.1 The committee recommends that the Division of Heart Disease and Stroke Prevention integrate hypertension prevention and control in programmatic efforts to effect system, environmental, and policy changes through collaboration with other CDC units and their external partners, to ensure that population-based lifestyle or behavior change interventions where delivered, are delivered in a coordinated manner that includes a focus on the prevention of hypertension. High priority programmatic activities to collaborate on include interventions for:

- **reducing overweight and obesity**
- **promoting the consumption of a healthy diet that includes a higher intake of fruits, vegetables, whole gains, and unsaturated fats and reduced amounts of overall calories, sugar, sugary beverages, refined starches, and saturated and trans fats (for example, a diet that is consistent with the OmniHeart diet)**
- **increasing potassium rich fruits and vegetables in the diet**
- **increasing physical activity**

4.2 The committee recommends that population-based interventions to improve physical activity and food environments (typically the focus of other CDC units) should include an evaluation of their feasibility and effectiveness, and their specific impact on hypertension prevalence and control.

4.3 To create a better balance between primary and secondary prevention of hypertension the committee recommends that the Division of Heart Disease and Stroke Prevention leverage its ability to shape state activities, through its grant making and cooperative agreements, to encourage state activities to shift toward population-based prevention of hypertension.

The committee views a population-based policy and systems approach to prevent and control hypertension at the state and local level to be consistent with the broad mandates of state and local public health jurisdictions.

6.1 The committee recommends that state and local public health jurisdictions give priority to population-wide approaches over individual-based approaches to prevent and control hypertension.

6.2 The committee recommends that state and local public health jurisdictions integrate hypertension prevention and control in programmatic efforts to effect system, environmental, and policy changes that will support healthy eating, active living, and obesity prevention. Existing and new programmatic efforts should be assessed to ensure they are aligned with populations most likely to be affected by hypertension such as older populations which are often not the target of these programs.

Based upon 2004 statistics using calculated intakes of sodium, 87 percent of US adults consumed what the CDC considers excess sodium (>100 mmol of sodium ≅ >2,400 mg sodium ≅ >6,000 mg of salt [sodium chloride]) (NCHS, 2008). Further, the American Heart Association recommends that African Americans and persons who are middle aged or older or who have hypertension should consume less than 1,500 mg of sodium daily. Calculated sodium intake may not be accurate because the large majority of sodium in the US food supply is added in processing and manufacturing of foods, and a large and increasing amount is used in the fast food industry. The amounts added can vary widely by brand and with time, making calculations difficult, and the smaller amounts added at home can also be challenging to quantify. Unfortunately, 24-hour urinary sodium excretion, which provides the best measure of sodium intake, has never been assessed in a nationally representative sample of the U.S. population, so that the true distribution of intakes in the United States is not known.

The committee finds the evidence base to support policies to reduce dietary sodium as a means to shift the population distribution of blood pressure levels in the population convincing. The newly reported analysis of the substantial health benefits (reduced number of individuals with hypertension) and the equally substantial health care cost savings and QALYs saved by reducing sodium intake to the recommended 2,300 mg per day and lower, provide resounding support to place a high priority on policies to reduce sodium intake (Palar and Sturm, 2009).

The committee is aware of the Congressional directive to CDC to engage in activities to reduce sodium intake and the DHDSP's role in these activities. The DHDSP's sponsorship of an IOM study to identify a range of interventions to reduce dietary sodium intake is an important step. The committee believes that the DHDSP is well positioned to take greater leadership in this area through it role as co-leader of Healthy People 2010 Focus Area 12: Heart Disease and Stoke, Co-Leader of the National Forum for Heart Disease and Stroke, and as the sponsor of grants to state health departments and other entities.

4.4 The committee recommends that The Division of Heart Disease and Stroke Prevention take active leadership in convening other partners in the federal, state, local government, and industry to advocate for and implement strategies to reduce sodium in the American diet to meet dietary guidelines, which are currently less than 2.3 grams (100mmol)/day and 1.5 grams (100mmol)/day for blacks, middle-aged and older adults, and individuals with hypertension.

The committee recognizes other work in progress by the IOM Committee on Strategies to Reduce Sodium Intake therefore it did not develop specific recommendations for specific intervention strategies.

Of all of the modifiable risk factors for hypertension, an inadequate consumption of potassium based on the current Dietary Reference Intakes (DRI) criteria (IOM, 2004) is among the most prevalent. In a recent report from the CDC (NCHS, 2008), approximately 2 percent of U.S. adults met the current guidelines for dietary potassium intake (≥4.7 grams per day or 4,700 mg), but insufficient potassium intake is most prevalent in Blacks and Hispanics, among whom the proportion consuming an adequate amount of potassium was close to 0 percent. Of note, the primary basis of the Dietary Reference Intake (DRI) of 4.7 grams per day for potassium is its beneficial effect on blood pressure (IOM, 2004).

4.5 The committee recommends that the Division of Heart Disease and Stroke Prevention specifically consider as a strategy, advocating for the greater use of potassium/sodium chloride combinations as a means of simultaneously reducing sodium intake and increasing potassium intake.

State and local health jurisdictions can also play a strong role in formulating policies and other activities to reduce sodium in the diet. Across the country, 26 state and local public health agencies and 17 professional associations and organizations have coalesced to work toward the goal of reducing salt intake through the National Salt Reduction Initiative (The City of New York, 2009).

6.3 The committee recommends that all state and local public health jurisdictions immediately begin to consider developing a portfolio of dietary sodium reduction strategies that make the most sense for early action in their jurisdiction.

Surveillance

Data collection is fundamental to addressing any public health problem. Data are critical for determining the burden of hypertension, characterizing the patterns among subgroups of the population, assessing changes in the problem over time, and evaluating the success of

interventions. Repeated independent cross-sectional surveys in the same populations over time can provide important information about secular trends in blood pressure. In the general U.S. population, government surveys (NHES I [National Health Examination Survey]; NHANES I, II, and III [National Health and Nutrition Examination Survey]; HHANES [Hispanic Health and Nutrition Examination Survey]) may provide the best data to examine secular trends in hypertension. However, there are marked, not easily explainable changes in the temporal trends for hypertension based on NHANES data. In particular, there was a dramatic reduction in age-adjusted hypertension prevalence between NHANES II (1976-1980) from 31.8 to 25 in NHANES III (1991-1994). At the same time, there have been significant modifications in the protocol for blood pressure measurement, sample sizes, and other factors that may increase the potential for measurement error (Burt et al., 1995). As a consequence, there is ongoing uncertainty about the validity and therefore usefulness of long-term temporal data for U.S. trends in hypertension.

Effective monitoring and surveillance systems need to be in place to monitor progress in reducing the prevalence of hypertension and increasing the awareness, treatment, and control of hypertension. Given the challenges posed by the changing methodologies used to collect blood pressure measurements, the committee believes that efforts to strengthen hypertension surveillance and monitoring are critical.

2.1 The committee recommends that the Division for Heart Disease and Stroke Prevention

- **Identify methods to better use (analyze and report) existing data on the monitoring and surveillance of hypertension over time.**
- **Develop norms for data collection, analysis, and reporting of future surveillance of blood pressure levels and hypertension.**

In developing better data collection methods and analyses, the DHDSP should increase and improve analysis and reporting of understudied populations including: children, racial and ethnic minorities, the elderly, and socioeconomic groups.

Access to and use of hypertension measures at the state and local health jurisdictions (SLHJs) level has proven especially difficult. The primary national data source for population estimates of hypertension – National Health and Nutrition Examination Survey (NHANES)– is not designed to produce accurate state or local estimates. This shortcoming is a major one, as there is likely substantial variation across regions not only in prevalence but in the proportions of the hypertensive population not diagnosed, diagnosed but not under treatment, and under treatment but not controlled. Some state and localities have begun to develop local level HANES to better monitor hypertension.

6.4 The committee recommends that state and local public health jurisdictions assess their capacity to develop local HANES as a means to obtain local estimates of the prevalence, awareness, treatment and control of hypertension. Further, if a program to reduce hypertension is a national goal, funding should be made

available to assure that localities have relevant data that will assist them in addressing hypertension in their communities.

The committee recognizes that local financial constraints may not allow many SLHJs to move forward in this regard in the short-term; thus, SLHJs may want to actively seek other reliable and available population-based data sets as a way to monitor local hypertension trends.

Accurate information on sodium intake or the content of sodium in specific foods that presently contribute importantly to sodium intake is necessary for monitoring its reduction. These data are not currently available in a systematic or timely fashion. The lack of data presents a significant gap that will hamper efforts to evaluate the progress made in reducing sodium intake in the American population.

4.6 The committee recommends that the Division of Heart Disease and Stroke Prevention and other CDC units, explore methods to develop and implement data gathering strategies that will allow for a more accurate assessment and tracking of specific foods that are important contributors to dietary sodium intake by the American people.

4.7 The committee recommends that the Division of Heart Disease and Stroke Prevention and other CDC units, explore methods to develop and implement data gathering strategies that will allow for a more accurate assessment and the tracking of population-level dietary sodium and potassium intake including the monitoring of 24-hour urinary sodium and potassium excretion.

System Change Strategies Directed at Individuals with Hypertension

Although patient nonadherence to treatment is one reason for lack of hypertension control, the lack of physician adherence to Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guidelines (JNC) contributes to the lack of awareness, lack of pharmacologic and non-pharmacologic treatment, and lack of hypertension control in the United States (Chiong, 2008; Pavlik et al., 1997). Studies show that despite the JNC recommendation to screen and to start treatment if systolic blood pressure is >140 mm Hg or diastolic blood pressure is >90 mm Hg, physicians are not providing treatment consistent with the guidelines. In particular, physicians are less aggressive in treating elevated blood pressure in older patients and less aggressive in treating isolated systolic hypertension (Berlowitz et al., 1998; Chiong, 2008; Hyman et al., 2000; Izzo et al., 2000; Lloyd-Jones et al., 2002). In fact, the largest attributable fraction for lack of awareness and lack of control of hypertension is being aged 65 or older and having isolated hypertension. According to Hyman and Pavlik, "Undiagnosed hypertension and treated but uncontrolled hypertension occurs largely under the watchful eye of the health care system" (Hyman and Pavlik, 2001). While the reasons for physician nonadherence to JNC guidelines are unclear, lack of physician awareness and physician beliefs about the practicality and benefit of treatment may contribute.

The goal of improving the education and training of health care providers in the prevention of cardiovascular disease is central to DHDSP activities. Numerous questions remain regarding whether the lack of adherence is related to a lack of physician agreement with the new treatment guidelines, physician lack of knowledge regarding the guidelines, inertia based on treating at the previous guideline of 160 mmHg/95 mmHg, or other barriers.

5.1 The committee recommends that the Division of Heart Disease and Stroke Prevention give high priority to conducting research to better understand the reasons behind poor physician adherence to current JNC guidelines. Once these factors are better understood, strategies should be developed to increase the likelihood that primary providers will screen for and treat hypertension appropriately, especially in elderly patients.

5.2 The committee recommends that Division of Heart Disease and Stroke Prevention work with the Joint Commission and the healthcare quality community to improve provider performance on measures focused on assessing adherence to guidelines for screening for hypertension, the development of a hypertension disease management plan that is consistent with JNC guidelines, and achievement of blood pressure control.

6.5 The committee recommends that state and local health jurisdictions serve as conveners of health care system representatives, physician groups, purchasers of health care services, quality improvement organizations, and employers (and others) to develop a plan to engage, and leverage skills and resources for improving the medical treatment of hypertension.

Controlling for health status, financial burden has been shown to be significantly greater for persons with chronic conditions such as hypertension (Rogowski et al., 1997). Many studies, using a variety of methodologies, have documented a relationship between patient cost and poorer adherence to treatment and poorer control of hypertension (Fihn and Wicher, 1988). Out-of-pocket cost of medication has been identified in the literature as a significant barrier to patient adherence to hypertension treatment. It is estimated that for every 10 percent increase in cost-sharing, overall prescription drug spending decreases by 2-6 percent (Kilgore and Goldman, 2008). The impact of out-of-pocket costs is greatest for those with low income, those with chronic illnesses, and those taking multiple drugs (Austvoll-Dahlgren et al., 2008). Reducing out-of-pocket costs increases medication adherence. Goldman compared the impact of reducing out-of-pocket costs with other interventions designed to improve patient adherence to chronic medications and noted that even the most successful interventions designed to increase patient adherence to medication did not result in larger improvements in adherence than cost strategies and generally relied on complicated, labor-intensive regimens (Goldman et al., 2007). The committee finds the evidence convincing that reducing costs of antihypertensive medication is an important and efficient way to increase medication adherence.

5.3 The committee recommends that the Division of Heart Disease and Stroke Prevention should encourage the Centers for Medicare and Medicaid Services to recommend the elimination or reduction of deductibles for antihypertensive medications among plans participating under Medicare Part D, and work with state Medicaid programs and encourage them to eliminate deductibles and copayments for antihypertensive medications. The committee also recommends that the DHDSP work with the pharmaceutical industry and its trade organizations to standardize and simplify applications for patient assistance programs that provide reduced-cost or free antihypertensive medications for low-income or uninsured individuals.

6.6 State and local health jurisdictions should work with business coalitions and purchasing coalitions to remove economic barriers to effective antihypertensive medications for individuals who have difficulty accessing them.

The committee notes that the Division is also well positioned to educate the private sector that eliminating or reducing the costs of antihypertensive medications is an important and efficient way to increase medication adherence. Through collaborations with partners, the Division provides support and guidance to the employer community on hypertension and cardiovascular disease prevention and control. The private sector is already experimenting with reducing copayments associated with drugs commonly prescribed for diabetes, asthma, and hypertension (Pitney Bowes, Marriott, and others). The results of the studies showing the impact of cost-sharing and the reporting of improved outcomes from these company's experiences should be shared broadly with the business community through trade associations and purchasing coalitions.

5.4 The committee recommends that the Division of Heart Disease and Stroke Prevention collaborate with leaders in the business community to educate them about the impact of reduced costs on antihypertensive medication adherence and work with them to encourage employers to leverage their healthcare purchasing power to advocate for reduced deductibles and copayments for antihypertensive medications in their health insurance benefits packages.

The use of community health workers to support the care of individuals with hypertension has been identified as a promising strategy. Community health workers have contributed to higher medication adherence among individuals with hypertension and have been shown to play an important role in linking and navigating diverse communities to the health care system. Some of the roles and the successes achieved appear to be similar to those of nurses who have provided educational interventions aimed at hypertension control, and suggest an efficient strategy for bringing about enhanced treatment and sustained blood pressure control for targeted racially or ethnically diverse, high-risk populations. While trained laypeople cannot perform in the same capacity as professional nurses and health educators, with appropriate training and supervision they can successfully contribute to the care of community members with hypertension (Bosworth et al., 2005).

Community health workers may also play an important role in linking diverse communities to the health care system for care (HRSA, 2007). The IOM committee that produced the report Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare found that "community health workers offer promise as a community-based resource to increase racial and ethnic minorities' access to healthcare and to serve as a liaison between healthcare providers and the communities they serve." Based on this finding, the committee recommended supporting the use of community health workers. "Programs to support the use of community health workers (e.g., as health care navigators), especially among medically underserved and racial and ethnic minority populations, should be expanded, evaluated, and replicated" (IOM, 2002, p. 195).

5.5 The committee recommends that the Division of Heart Disease and Stroke Prevention work with state partners to leverage opportunities to ensure that existing community health worker programs include a focus on the prevention and

control of hypertension. In the absence of such programs, the Division should work with state partners to develop programs of community health workers who would be deployed in high risk communities to help support healthy living strategies that include a focus on hypertension.

6.7 State and local health jurisdictions should promote and work with Community Health Worker initiatives to ensure that prevention and control of hypertension is included in the array of services they provide and are appropriately linked to primary care services.

In an era of declining resources and conflicting priorities for public health, taking on any new challenges needs careful consideration. But given the disease and economic burden associated with hypertension, and in the current climate of health care reform and increasing attention to prevention, there is great public health opportunity and no better time to rise to the challenge.

6.8 The committee recommends that the Congress give priority to assuring adequate resources for implementing a broad suite of population-based policy and system approaches at the federal, state and local levels that have the greatest promise to prevent, treat, and control hypertension.

Attendant to current funding and potential future funding for hypertension prevention, treatment and control, systems need to be in place to track and measure current and new programs activities at the federal, state, and local level. Such a system would help ensure that resources are appropriately aligned and outcomes are achieved.

6.9 The committee recommends that Division of Heart Disease and Stroke Prevention develop resource accountability systems to track and measure all current and new State programs for the prevention, treatment and control of hypertension that would allow for resources to be assessed for alignment with the population-based policy and systems strategy and for measuring the outcomes achieved.

The committee acknowledges that the recommendations proffered, if adopted, would result in a significant programmatic change for the DHDSP. To effectively support the change and maintain a population-based focus, new expertise and guidance may be required beyond that which may be available through the DHDSP's partnership with the National Forum for Heart Disease and Stroke Prevention.

6.10 The committee recommends that the Division of Heart Disease and Stroke Prevention identify and work with experts grounded in population-based approaches to provide guidance and assistance in designing and executing hypertension prevention and control efforts that focus on population-based policy and system change. These experts could augment an existing advisory body or be drawn from an existing body with this expertise.

The committee believes that attention to the high priority areas it has identified would ultimately lead to a reduction in the prevalence of hypertension, improve the quality of care

provided to individuals with hypertension, reduce health disparities, and ultimately reduce mortality and morbidity due to heart disease and stroke.

In the short term, one visible impact would be strong federal, state, and local public health agency leadership that gives priority to reducing the prevalence of hypertension through population-based approaches integrated throughout agency activities, particularly those that target hypertension risk factors by reducing obesity, promoting health diets, increasing physical activity and reducing sodium intake.

Active engagement and efforts by federal, state, and local jurisdiction to reduce sodium consumption, an area not typically addressed by parts of the governmental public health system, is an area where federal and SLHJ could exert a unique leadership role. Efforts to improve the surveillance and monitoring systems that track hypertension trends would result in improved estimates of hypertension prevalence, awareness, and treatment and control for the population as a whole and subgroups of the population at the national and state and local level. Similarly, with improved data collection, public health officials would be able to monitor their progress in reducing dietary sodium consumption and the sodium content in food. Strategies designed to address the factors contributing to poor physician adherence to JNC treatment guidelines would result in improved blood pressure control, especially isolated systolic hypertension among the elderly. The visible impacts of removing economic barriers to effective antihypertensive medications and employing the use of community health workers to provide community-based support for individuals with hypertension would be improved access to treatment, particularly for vulnerable populations.

The committee observes that hypertension may provide an opportunity unparalleled in public health chronic disease prevention for program evaluation through outcome measurement. In this context, it provides a single, reliable outcome measure that can be linked to intervention process measures to rapidly inform program interventions.

The committee offers a number of short-term and intermediate outcomes and potential process and outcome indicators to assess progress in the high-priority areas in Table S-2. Decreased mortality and morbidity from heart disease and stroke are understood as the ultimate long-term indicators, as such, they are not included in the table due to space consideration. The table is divided into broad sections (e.g., Population-based Recommendations to CDC's Division of Heart Disease and Stroke Prevention (DHDSP) and State and Local Jurisdictions (SLHJ), System Approaches Targeting Individuals with Hypertension Directed to CDC and State and Local Health Jurisdictions, and others. Outcomes and indicators found in adjacent columns do not tract directly across but correspond to the group of recommendations.

Hypertension as a Sentinel Indicator for Health Disparities

Hypertension is a disease for which there are major inequities across racial groups and economic groups—along the entire spectrum from risk factors to delivery of medical care. Interventions directed toward general population groups historically do not correct these inequities and can even worsen them. Care must be taken to assure that any portfolio of interventions implemented will minimize existing inequities in prevention, detection, treatment and control of hypertension.

Hypertension is a condition strongly influenced by underlying individual and community risk factors related to healthy eating and active living – risk factors driven by race and class in

most communities today. As such, it is a potential sentinel indicator for assessing and testing broader approaches to reduce health disparities. The prevalence of hypertension may provide a relative quick and objective measure of programs directed at these risk factors as well as underlying social determinants of health. Hypertension while treatable requires ongoing access to primary care for maximum effectiveness. As such, it is also a potentially very good marker for lack of access to or continuity of health care in a community. SLHJs should consider hypertension as a sentinel measure for evaluation of the effectiveness of a range of disparity-reducing activities, including importantly, place-based strategies tackling conditions through community policy interventions.

TABLE S-2 Priority Recommendations

Population-based Recommendations to the Division of Heard Disease and Stroke Prevention (DHDSP) and State and Local Health Jurisdictions (SLHJ)

Recommendations to Enhance Population–based Efforts and to Strengthen Efforts among CDC Units and Partners

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
4.1 DHDSP should integrate hypertension prevention and control in programmatic efforts to effect system, environmental, and policy changes through collaboration with other CDC units and their external partners. High priority programmatic activities to collaborate on include interventions for:	Better targeting and integration of hypertension prevention in other CDC unit programming	Budget allocated to population-based policy and system approaches by CDC	Reduction of hypertension risk factors in the population	Prevalence of overweight/obesity Proportion of individuals who consume a healthy diet
-reducing overweight and obesity -promoting the consumption of a healthy diet -increasing potassium rich fruits and vegetables in the diet -increase physical activity.	New CDC budget and programs dedicated to policy and program system change strategies for hypertension	Budget and plans for hypertension program integration into other CDC prevention activities	Reduced incidence of hypertension	Proportion of children and adults who participate regularly in physical activities
4.3 DHDSP should leverage its ability to shape state activities, through its grant making and cooperative agreements, to encourage state activities to shift toward population-based prevention of hypertension.	Prevention of hypertension integrated in other unit strategies to: reduce overweight and obesity, promote healthy diet, increase consumption of fruits and vegetables, increase physical activity	Number of federal, state, and community policy and environmental strategies implemented to control high blood pressure	Reduced prevalence of hypertension	Percent reduction in disparities in high blood pressure risk factors between general and priority populations
6.1 SLHJ should give priority to population-based approaches over individual-based approaches to prevent and control hypertension.		Number of SLHJs which have added hypertension program elements and focus to non-hypertension programs		

Recommendations to Enhance Population–based Efforts and to Strengthen Efforts among CDC Units and Partners

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
6.2 SLHJ should integrate hypertension prevention and control in programmatic efforts to effect system, environmental, and policy changes that will support healthy eating, active living, and obesity prevention. Existing and new programmatic efforts should be assessed to ensure they are aligned with populations most likely to be affected by hypertension such as older populations which are often not the target of these programs.	Strong federal, state, and local public health agency leadership that gives priority to reducing the prevalence of hypertension through population-based approaches integrated throughout agency activities	Number of SLHJs with comprehensive programs for population hypertension control programs		

Recommendations to Strengthen Leadership in Reducing Sodium Intake and Increasing Potassium Intake

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
4.4 DHDSP should take active leadership in convening other partners in the federal, state, local government, and industry to advocate for and implement strategies to reduce sodium in the American diet to meet dietary guidelines, which are currently less than 2.3 grams (100mmol)/day and 1.5 grams (100mmol)/day for blacks, middle-aged and older adults, and individuals with hypertension.	Aggressive actions at the federal, state, and local levels to reduce sodium consumption and sodium content in the diet Development and implementation of federal, state, local programs to reduce sodium intake	Proportion of states and localities with a strategic plan to reduce sodium intake and sodium content in food Federal, state and local budget and plans for programs to reduce sodium intake	Reduction of salt consumption by the American population Reduction of salt content in food Reduced prevalence of hypertension	Mean population urinary sodium excretion level Proportion of individuals who consume five or more fruits and vegetables per day.
6.3 SLHJ jurisdictions should immediately begin to consider developing a portfolio of dietary sodium reduction strategies that make the most sense for early action in their jurisdiction.		Number of states implementing new or expanded programs to increase potassium rich fruit and vegetable consumption		Mean population urinary potassium excretion level
4.5 DHDSP should specifically consider as a	Development and	Budget and plans for	Increase in potassium	Mean and median

Recommendations to Strengthen Leadership in Reducing Sodium Intake and Increasing Potassium Intake

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
strategy, advocating for the greater use of potassium/sodium chloride combinations as a means of simultaneously reducing sodium intake and increasing potassium intake.	implementation of programs to increase potassium intake	programs for increasing potassium consumption	rich fruit and vegetable consumption Reduction of hypertension risk factors in the population	blood pressure levels

Recommendations to Improve the Surveillance and Reporting of Hypertension and Risk Factors

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
4.6 DHDSP and other CDC units, should explore methods to develop and implement data-gathering strategies that will allow for more accurate assessment and tracking of specific foods that are important contributors to dietary sodium intake by the American people.	Improved systems for measuring or estimating sodium content in food are designed and implemented	Availability of data on specific foods that are important contributors to dietary sodium intake by the American people	Data on high sodium containing foods are tracked and used to develop strategies for reduction	Percent of high content sodium products that have reduced their sodium content
4.7 DHDSP and other CDC units should explore methods to develop and implement data gathering strategies that will allow for a more accurate assessment and the tracking of population-level dietary sodium and potassium intake including the monitoring of 24-hour urinary sodium and potassium excretion.	Improved systems for measuring or estimating dietary sodium and potassium intake are designed and implemented	Availability of mean population dietary sodium and potassium intake at the national, state, and local level	Data on dietary sodium consumption are available and used to target dietary sodium reduction programs	Reduction in mean dietary sodium intake
4.2 The committee recommends that population-based interventions to improve	Greater collaboration among CDC units on population-	Number of CDC activities that include a focus on	Data on feasibility and effectiveness of a broad	Reduction in adverse lifestyle behaviors

Recommendations to Improve the Surveillance and Reporting of Hypertension and Risk Factors

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
physical activity and food environments (typically the focus of other CDC units) should include an evaluation of their feasibility and effectiveness and their specific impact on hypertension prevalence and control.	based interventions to prevent hypertension	hypertension prevention and control.	range of interventions that contribute to the prevention of hypertension	
2.1 DHDSP should identify methods to better use (analyze and report) existing data on the monitoring and surveillance of hypertension over time and develop norms for data collection, analysis, and reporting of future surveillance of blood pressure levels and hypertension. In developing better data collection methods and analyses, the DHDSP should increase and improve analysis and reporting of understudied populations including: children, racial and ethnic minorities, the elderly and socioeconomic groups.	Guidance on methods for analyzing and reporting existing data for monitoring and surveillance of hypertension and future data collection methods and analysee	Improved estimates of hypertension prevalence, awareness, and treatment and control for the population as a whole and subgroups of the population (children, racial and ethnic and racial minorities, the elderly and socioeconomic groups) at the national, state, and local level	Improved capacity for assessing and monitoring progress in hypertension prevention and control	Improved program design and implementation as a result of better data
6.4 SLHJ should assess their capacity to develop local HANES as a means to obtain local estimates of the prevalence, awareness, treatment and control of hypertension. Further, if a program to reduce hypertension is a national goal, funding should be made available to assure that localities have relevant data that will assist them in addressing hypertension in their communities.	Increased number of state and localities with a NHANES – like survey	Number of states and localities with data systems that provide estimates of the prevalence, awareness, treatment, and control of hypertension for their jurisdiction	Access to local data on hypertension trends	Number of states and localities that are implementing program changes based on local surveillance and reporting information

System Change Recommendations Directed at Individuals with Hypertension

Recommendations to Improve the Quality of Care Provided to Individuals with Hypertension

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
5.1 DHDSP should give high priority to conducting research to better understand the reasons behind poor physician adherence to current JNC guidelines. Once these factors are better understood, strategies should be developed to increase the likelihood that primary providers will screen for and treat hypertension appropriately, especially in elderly patients.	Better understanding of reasons behind poor physician adherence to JNC guidelines Targeted strategies to improve provider awareness, understanding, acceptance, and adherence to JNC treatment guidelines	Proportion of providers who measure and classify blood pressure according to JNC Guidelines Proportion of providers who follow JNC pharmacologic therapies for treatment of hypertension	Improved rates of diagnosed, treated, and controlled patients, especially systolic blood pressure control among the elderly	Proportion of individuals with hypertension who have achieved blood pressure control
5.2 DHDSP should work with the Joint Commission and the healthcare quality community to improve provider performance on measures focused on assessing adherence to guidelines for screening for hypertension, the development of a hypertension disease management plan that is consistent with JNC guidelines, and achievement of blood pressure control.	Partnerships with healthcare quality community focused on improving provider performance on quality measure for hypertension	Proportion of patients who receive provider-initiated prescription and follow-up of therapeutic lifestyle modifications Proportion of patients with uncontrolled high blood pressure who have documented provider initiated change in pharmaceutical intervention	Improvements in state or local level provider performance in quality measures associated with blood pressure treatment and control	Proportion of older individuals with systolic hypertension who receive appropriate treatment
6.5 SLHJ should serve as conveners of health care system representatives, physician groups, purchasers of health care services, quality improvement organizations, and employers (and others) to develop a plan to engage, and leverage skills and resources for improving the medical treatment of hypertension	Development of local level partnerships between SLHJ and health care representatives, physician groups, purchasers of health care services, quality improvement organizations, and employers around hypertension prevention and control	Development of local collaborative plans to address hypertension prevention, control and treatment		Improvement in state reported diagnosis, treatment and control rates

Recommendations to Remove Economic Barriers to Effective Antihypertensive Medications

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
5.3 DHDSP should encourage the Centers for Medicare and Medicaid Services to recommend the elimination or reduction of deductibles for antihypertensive medications among plans participating under Medicare Part D, and work with state Medicaid programs and encourage them to eliminate deductibles and copayments for anti-hypertensive medications. The committee also recommends that the DHDSP work with the pharmaceutical industry and its trade organizations to standardize and simplify applications for patient assistance programs that provide reduced-cost or free antihypertensive medications for low-income, underinsured or uninsured individuals.	Reduced cost for effective antihypertensive medication, especially among the poor, elderly, and those without health insurance coverage	Out-of-pocket costs for antihypertensive medications by insurance and economic status	Improved adherence to antihypertensive medications especially in the poor, elderly, and those without insurance Improved hypertension control, especially in the poor, elderly, and those without insurance	Prevalence of controlled hypertension, especially in the poor, elderly, and those without insurance Proportion of patients who adhere to antihypertensive medication regimens Degree of disparity in blood pressure control between general and priority populations
5.4 DHDSP should collaborate with leaders in the business community to educate them about the impact of reduced patient costs on antihypertensive medication adherence and work with them to encourage employers to leverage their healthcare purchasing power to advocate for reduced deductibles and copayments for antihypertensive medications in their health insurance benefits packages.	Partnerships between DHDSP and business community focused on reducing out-of-pocket costs for antihypertensive medications	Out-of-pocket costs for antihypertensive medications for worksite employees	Improved adherence to antihypertensive medications among employees	Proportion of employees who adhere to antihypertensive medication regimens Degree of disparity in blood pressure control between general and priority employee populations
6.6 SLHJ should work with business coalitions and purchasing coalitions to remove economic barriers to effective antihypertensive medications for individuals who have difficulty accessing them.	Partnerships between SLHJ and business community focused on reducing out-of-pocket costs for antihypertensive medications			

Recommendations to Provide Community Support for Individuals with Hypertension

Priority Recommendation	Short Term Outcomes (or process input or outputs)	Short Term Indicator	Intermediate Outcomes	Intermediate Indicators
5.5 DHDSP should work with state partners to leverage opportunities to ensure that existing community health worker programs include a focus on the prevention and control of hypertension. In the absence of such programs, the DHDSP should work with state partners to develop programs of community health workers who would be deployed in high-risk communities to help support healthy living strategies that include a focus on hypertension. 6.7 SLHJ should promote and work with community health worker initiatives to ensure that prevention and control of hypertension is included in the array of services they provide and are appropriately linked to primary care services.	Design and implementation of new or enhanced community health worker programs targeting hypertension control	Budget allocated to development or enhancement of community health worker programs Number of community health worker programs targeting hypertension	Improved hypertension control in communities served by community health worker programs	Prevalence of uncontrolled hypertension in communities served by community health workers Degree of reduction in disparities in blood pressure control between general and populations served by community health workers

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A Population-Based Policy and Systems Change Approach to Prevent and Control Hypertension

Committee on Public Health Priorities to Reduce and Control Hypertension in the U.S. Population

Board on Population Health and Public Health Practice

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Willing is not enough; we must do."
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COMMITTEE ON PUBLIC HEALTH PRIORITIES TO REDUCE AND CONTROL HYPERTENSION IN THE U.S. POPULATION

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REVIEWERS

This report has been reviewed in draft form by persons chosen for their diverse perspectives and technical expertise in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards of objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We thank the following for their review of the report:

Lawrence J. Appel, Johns Hopkins Bloomberg School of Public Health
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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of the report was overseen by **Kristine M. Gebbie.** Appointed by the National Research Council and the Institute of Medicine, she was responsible for making certain that an independent examination of the report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of the report rests with the author committee and the institution.

CONTENTS

Tables and Figures

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